Children with Specific Language Impairment Through the CCC-2 Questionnaire

Helena Podpěrová, Anna Kucharská

Abstract: The contribution presents pilot adaptation of the Children's Communication Checklist-2 questionnaire by Bishop (1989) within the Czech population, specifically aimed at the assessment of its ability to distinguish children with Specific Language Impairment from children with typical development. The work includes comparisons of basic scores, as well as of the questionnaire subtests. The sample comprised 77 children of preschool age. The analysis performed has confirmed statistically significant differences between the groups that were researched and therefore also an accordance with the declared objectives of the questionnaire. The findings are discussed within the context of theoretical grounds, current knowledge, possible limitations, and possible options for future investigation.

Key words: Specific Language Impairment, questionnaire, CCC-2, communication, verbal communication skills

Introduction

The Children's Communication Checklist (CCC-2) was developed by Dorothy Bishop in 2003 as a revised version of the CCC questionnaire (1998) to assess the aspects of the Specific Language Impairment and/or dysphasia that are inadequately assessed by the current standardised language tests and are considered clinically significant. Such aspects include pragmatic abnormalities occurring in social communication and other quantitative traits of speech and language included within the scale of the phenomena being researched. The aim of this study was to present a means for distinguishing specific subtypes within the population of children with language disorders. We have particularly focused on the question of whether the professionals, who are familiar with their child clients, would be able to agree on a technique for the assessment of communicative behaviour within the population with a previously identified language impairment and – if so – whether there is any proof of a distinct subgroup of children with complications affecting mainly semantic and pragmatic speech.

The CCC-2 instrument enables screening of communication disorders and identifies pragmatic and social deficiencies in interaction. According to Bishop (1998), these are the very deficiencies that are neglected by standard language tests – pragmatic speech deficiencies are less distinguishable in a common examination compared to daily life. The author of the CCC-2 defines pragmatics as a choice of appropriate communication and/or interpretation depending on the communication context (in Franke, Mikulajová, & Buntová, 2011).

The questionnaire was standardized on a wide sample of 542 UK children and youngsters with typical development ranging from four to 16 years of age, and with the assistance of their parents as informants, as they are naturally those who are in the closest contact with their children. The parents' assessments proved to coincide with clinical diagnoses. The informants might nevertheless differ in their ability to comprehend the specific items/topics and might be biased through subjective interpretations and prejudice. On the other hand, this approach made it possible to gain information on the day-to-day communication from persons who know the children intimately. Bishop et al. (2006) found out that the CCC-2 could be as effective as standardized tests in the identification of children with impaired speech development.

Methodology

General Background to the Research

The study was carried out within the scope of the research project *Enhancing Literacy Development in European Languages (*2008-2012). It was based on two fundamental pillars: international research in the field of the development of literacy at the European level (six research areas in total) and a training programme for beginning researchers (Sotáková, 2012). The questionnaire presented here formed part of the test battery in the section WP2 (*Identifying Risk Factors for Failure in Literacy Development in European Languages*), dealing with the links between preschool development and the level of pre-literacy and early literacy in the risk groups. Within a period of three years and in three stages (T1, T2, T3), three groups of children were repeatedly examined: children with Specific Language Impairment (SLI), children with family risks of learning disorders (FR), and children from the mainstream population (typical development, TD), with the objective being to find out what specific areas of the child's development are critical for the occurrence of specific learning disorders and/or what other influences cause the occurrence of the specific learning disorders in some children while not in others.[1]

[1] The author, D.V.M. Bishop, gave a permission for the use of the CCC2 questionnaire for research purposes in the ELDEL, W2 project. The results of the study were published in 2016. (Moll, K., Thompson, P. A., Mikulajova, K., Jagercikova, Z., Kucharska, A. Franke, H., Hulme, Ch., & Snowling,

Table 1. Target groups of WP2 respondents

Typical development children (TD)	Control group – children with standard development of speech; specific learning disorders excluded in close relatives.
Specific Language Impairment (SLI)	Experimental group – children with Specific Language Impairment (with developmental dysphasia).

Table 2. Criteria for inclusion into the SLI group

Pronunciation	Children pronouncing over 80% of phones incorrectly (the most frequently diagnosed dyslalia) were excluded from both the TD and SLI groups.
Language skills	Children achieving scores below -1δ in two of three tests (Vocabulary, Morphological Awareness Test, and Speech Recognition Test) and/or children whose score fell below -1δ in one test and equalled -1δ in the two remaining tests were included into the SLI group.

Research Sample

The research participants were mostly recruited in a leaflet campaign in kindergartens and paediatricians ´offices. 160 interested persons from among the parents or close relatives of the children showed their interest in participation in the research. This study involves data on typical development children (TD) and on children with Specific Language Impairment (SLI).

The CCC-2 questionnaire was distributed to the parents of children in the course of the T1 stage (April-October 2009). For the purposes of data processing it was possible to utilize questionnaires filled in by the parents of 77 children, of whom 43 children were from the TD (typical development) group and 34 children were diagnosed with SLI (Specific Language Impairment). The ages of the children ranged between 58 and 84 months. Further descriptive characteristics of the sample are listed in Table 3.

The comparison of both groups with respect to sex and age shows a disproportion between the boys and girls in both groups. The higher number of boys in the SLI sample shows agreement with the literature (Vitásková & Peutelschmiedová, 2005) – the boys show a greater inclination towards the incidence of impairments in the development of their speech than the girls do.

Tests and Procedures

The CCC-2 (Bishop, 2003) is composed of

M. J. (2016). Precursors of Reading Difficulties in Czech and Slovak Children At-Risk of Dyslexia. Dyslexia, 22, 2, 120-136, doi: https://doi.org/10.1002/dys.1526)

Table 3. Descriptive statistics of the research sample with respect to sex and age

Group		Total number	TD	SLI	Girls			Boys		
					TD	SLI	Total number	TD	SLI	Total number
		77	43	34	29	10	39	14	24	38
Age in months	Min	58	58	58	61	61	63	58	58	58
	Max	84	84	84	73	68	75	84	84	84
	Average	65	66	66	67	65	69	66	67	67
	Median	67	65	65	67	66	69	65	68	68
	SD	12.6	5	5	3	2	3.67	6	5.4	5.4

70 items divided into 10 sub-tests: A Speech, B Syntax, C Semantics, D Coherence, E Inappropriate initiation, F Stereotyped language, G Use of context, H Non-verbal communication, I Social relations, and J Interests. Each of the sub-tests is formed of seven items, of which five relate to deficiencies in communication and two are focused on various strengths in communication. To avoid confusing the examiner, the items evaluating difficulties in communication are listed in the first part of the questionnaire, while those relating to communicative skills are included in the second part of the CCC-2.

The examiner's task is to assess the frequency of each of the described aspects of the child's behaviour on a four-point scale where 0 means *"less than once in a week (or never)"*, 1 relates to the frequency of *"less than once in a week but not every day"*, 2 means behavioural aspects occurring *"once or twice in a day"*, and 3 means behavioural aspects occurring *"several times (more than twice) in a day"*. This method enables the child to be assessed in a more specific and less subjective manner.

The CCC-2 features two composite scores for the purposes of assessment:

- *General Communication Composite* (GCC) distinguishing children with communication disorders from children with typical development;
- *Social Interaction Deviance Composite* (SIDC) set up in order to be able to distinguish children with the typical image of SLI and those with a pragmatic language impairment.

The sum of sub-scales A-H states the GCC score used to identify children with a prospective clinical display of communication disorders. It is the index of the overall *communicative competence*. The sum of sub-scales A-D subtracted from the sum of sub-scales E, H, I, and J gives us the SIDC score used for the identification of children whose *pragmatic disorders* match their structural

Table 4. Descriptive statistics n of TD and SLI groups with respect to composite GCC and SIDC scores

Group		Composite score		Group		Composite score	
		GCC	SIDC			GCC	SIDC
TD	Average	74.23	-0,21	SLI	Average	54.85	7.91
	Median	73	-1		Median	54.5	6
	Mode	73	-4		Mode	62	5
	SD	13.15	7.74		SD	11.87	8.33
	Min	48	-16		Min	35	-7
	Max	101	18		Max	89	39

language skills inadequately. The SIDC score is also able to identify children with the communication profile of the autism spectrum disorder.

The GCC scores of children with typical development range above the boundary of 55, regardless of the SIDC score. Scores below 55 suggest clinically significant communication disorders. In such cases it is advisable to apply the SIDC score. The negative SIDC values indicate a disproportion between the pragmatic aspect of language and social aspects of communication, while its positive values suggest disproportions in the structural language skills. The profile of SLI children is typically associated with a value of nine points and more. Negative SIDC values ranging below -15 are considered diagnostically significant regardless of the GCC score. Such strongly negative values suggest a possible diagnosis of Asperger syndrome and autism spectrum disorder (Norbury et al., 2004; in Ferguson et al., 2011).

Results

Composite GCC and SIDC scores

The TD children reached an average GCC score of 74.23 points, with a median value of 73 points and with a relatively wide span of results ranging from 48 points (below the GCC standard boundary) to 101 points (table 4). Though the children in the TD group had been assessed in the standardized tests as pertaining to the "standard", four of them (9.3%) achieved a GCC score below the boundary for standard values.

The average GCC score in the group of SLI children amounted to 54.85 points, with a median value of 54.5 points. The scores generally pertain to the area described as a critical zone of output (10 percentile). The children's performances range within a rather wide span from 35 to 89 points. This group also includes children whose results in the criterion-referenced tests classify them into the SLI

group, who nevertheless do not belong in this group according to the assessment of their parents, who evaluate the language skills of their children as better than indicated by the results of the criterion-referenced tests. The CCC-2 results show that 15 children (44%) have no difficulties, i.e. their GCC score is above the critical value of 55 points. If a standard deviation of 3 is considered, the majority of the children (12) scored below the arithmetic mean (56-80). Three children even closely approached the critical value of 55, thus making the aforementioned information more accurate. It should be noted that the findings mentioned above did not mean exclusion of the children in question from the SLI group. The findings were regarded as evaluations of the child's manifestations by their parents, as will be discussed below.

The SIDC score average in the SLI group amounted to 7.91, with a median value of 6 and a span between -7 and 39. The average score achieved suggests belonging in the group of children with communication disorders. Ten children (29.4%) achieved an SIDC score of 9 or above, thus meeting the criteria for a communication profile typical of a more critical form of SLI. The SIDC scores of seven children (20.6%) within the group indicate impaired structural language skills. The negative SIDC value in two children suggests a significant imbalance between their social and/or pragmatic difficulties and their impaired structural language skills, which could indicate a pragmatic disorder.

The children with typical development reached an average SIDC score somewhere near 0 (-0.21), which is a balanced result with respect to the structural and pragmatic aspects of speech and communication.

When evaluating the statistical significance of the difference between the TD and SLI groups it was initially necessary to verify the normality of distribution. As this had been confirmed for the GCC scores (TD 0.720, SLI 0.348, p=0.05), we were able to apply a T-Test for two independent samples (unilateral) to assess statistical significance. As far as the SIDC scores are concerned, the normality of distribution had been confirmed only in the group of TD children (0.826, p=0.05, SLI 0.000) and a non-parametric Mann-Whitney U Test (unilateral) was therefore applied to evaluate the statistical significance of the differences. On the basis of the value of the observed significance of the F test criterion (of equality of variances), in case of GCC composite score we can assume the sample variances are equal (F=0.258, p=0.001). It should be noted that the SLI group shows worse results in its GCC score as regards the statistical significance (p=0.001) in comparison to the TD group.

CCC-2 sub-tests

Table 5 indicates the way the parents evaluated their children in the TD and SLI groups. Standard scores were applied here – the higher the score value, the better the communicative skills (average of 10, standard deviation of 3).

Table 5. Descriptive statistics of the TD and SLI groups with respect to sub-tests A-J and Analyses

		Subtests									
		A	**B**	**C**	**D**	**E**	**F**	**G**	**H**	**I**	**J**
TD	Average	**9.79**	**10.02**	**7.74**	**9.42**	**9.16**	**9.47**	**9.02**	**9.60**	**9.14**	**8,86**
	Median	10	10	7	9	9	9	8	9	10	8
	Mode	14	13	7	9	9	8	7	8	10	7
	SD	3.75	3.14	2.23	2.94	2.12	3.01	3.08	2.53	2.81	2,94
	Min	2	4	5	4	6	4	4	5	4	5
	Max	14	13	16	15	17	15	17	14	13	17
SLI	Average	**4.65**	**6.00**	**6.47**	**6.32**	**8.35**	**8.29**	**6.94**	**7.82**	**6.18**	**9,00**
	Median	4	5.5	7	6.5	8.5	8	7	7	5	9
	Mode	4	4	7	5	9	7	7	6	5	8
	SD	2.87	3.60	1.54	1.49	1.15	2.58	1.67	2.66	2.62	1,88
	Min	0	0	3	4	6	4	4	4	2	6
	Max	14	13	10	10	10	14	11	14	13	14
Man-Whit. U test		212.5	301	505.5	267.5	561.5	570	430	423.5	298.5	652.5
Asymp. Sig. (1-tailed)		0.000***	0.000***	0.009**	0.000***	0.038*	0.048*	0.001***	0.0005***	0.000***	0.208

Note: A non-parametric Mann-Whitney U Test (unilateral) was applied as the sub-test scores showed abnormal distribution
**p = 0.05; **p = 0.01; ***p = 0.001*

The SLI group achieved worse results (lower standard scores) in comparison to the TD group in all the sub-tests, except for sub-test J (Interests). It is obvious that the structural language aspects (A-D) are at a significantly lower level within the SLI group than in the mainstream population. As far as the pragmatic aspect of speech is concerned (E-H), there are certain differences; these are, however, less distinct. The last two sub-tests (I-J), dealing with the issue of social relations and unusual interests, showed important differences in the assessment. While in sub-test I the children in the TD group showed significantly higher average values, the differences were not that distinct in sub-test J. The results confirmed the

statistical significance of the differences between the TD and SLI groups, except for sub-test J (see Table 5).

Discussion and Conclusion

CCC-2 as a tool for the identification of children with SLI

On the basis of the evaluation of the CCC-2 questionnaire, we obtained two elementary outputs – two composite scores (GCC and SIDC) for the two groups that were examined (TD and SLI). We confirmed the good ability of the questionnaire to distinguish these groups. Further on, we concentrated on the separate CCC-2 sub-tests and compared them mutually with respect to the evaluation by parents. Considering the knowledge on specifically impaired development of speech that can manifest itself in one, several, or all language aspects, as well as in the emotional, social, and/or behavioural areas (Lechta et al., 2003; Klenková, 2006), the children in the TD group achieved significantly better evaluations than the children with SLI. This assumption was confirmed in the sub-tests that focused on the structural and pragmatic skills in communication, as well as in the sub-test mapping social relations, but (nevertheless) was not confirmed in sub-test J (Interests), where the difference between the two groups was not significant.

Ferguson et al. (2011) gained similar results in the assessment by means of CCC-2 from the viewpoint of the parents of SLI children in comparison with children attending mainstream schools, concluding that there was a statistically significant difference in the GCC scores between the two groups. The authors of the study observed the same group differences in all ten CCC-2 sub-tests. In a study aimed at testing the Norwegian adapted version of the CCC-2 on a sample of children aged 6-12 with SLI and TD, Helland et al. (2009) confirmed the differences between the groups on all the scales (A-J), as well as in the GCC score.

We assume that the CCC-2 questionnaire meets the purpose it was developed for in the Czech environment too and that it distinguishes the children with Specific Language Impairment from children with typical language development. Our findings can be compared with those of Franke, Mikulajová, & Buntová (2011), who verified the validity and reliability of the Slovak version of the CCC-2. Their conclusions are similar as regards the GCC score, where the TD children reached statistically significant higher values than the children from the SLI group.

Communication profiles by means of CCC-2

Further on, we wanted to describe the extent of the concordance between the classification of a child on the basis of the CCC-2 (i.e. from the viewpoint of the parent) and on the criterion-referenced tests.

The limit of the GCC score to distinguish the norm from the risk is set to 55 points. In cases where the GCC score ranges below this limit, it is possible to additionally carry out interpretation of the SIDC score distinguishing between pragmatic/structural conditions and the communication profiles of ASD/Asperger syndrome. Our sample included 77 children (43 TD and 34 SLI). The average GCC composite score reflecting the general language level of the specific individual amounted to 74.23 (median 73, SD=13.5) in the TD group. These values are comparable with those of the verification study by Franke, Mikulajová, and Buntová in 2011 (GCC average of 75.98, median 76, and SD 14).

86% of the children classified into the TD group on the basis of the standard tests were assessed by their parents as developing typically with respect to their use of language in their day-to-day life. Out of the remaining six children (14%), one showed great disproportion in the resulting values for their GCC and SIDC scores (101/-16), which – according to Norbury et al. (2004; in Ferguson et al., 2011) – could indicate a communication profile corresponding to Asperger syndrome/ASD. In the case of a further two children we could consider deficiencies in the structural aspects of language, two children demonstrated a communication profile corresponding to SLI (SIDC > 9), and one child demonstrated a communication profile indicating deficiencies in pragmatic skills and social communication.

The group of children identified as SLI in the criterion-referenced tests showed interesting results. 56% of the children (19) were assessed below the norm limit (10th percentile, GCC < 55), 44% of the children had a higher score than the critical boundary or the same. From among the children with a GCC score below 55, almost half, we identified SLI (SIDC > 9) in 10 children (29% of the SLI group) and deficiencies in the structural language aspects in seven children (21%). (The GCC score in this group had very similar values to those of the TD group in the aforementioned study by the Slovak authors).

When interpreting the results we have to consider the fact that the parent's assessment may be subjective as the parents understand their children and tend to judge the children's potential problems in communication less strictly. We should also take into account the question of whether the parents are able to assess all the aspects of the child featured in the questionnaire. There is a tendency towards overestimation. Franke, Mikulajová, and Buntová (2011) observed that the parents and their sensitive tuning to the children's needs and communication style and the non-verbal communication, emotional, and other factors affecting communication, enhance the performance of the child. The children with such favourable conditions for their language development have positive prospects and a good prognosis for the improvement of their language skills.

The interpretation of the children

from the TD group who reached the norm in the standard tests and examinations while remaining below the norm in their assessment with the CCC-2 is interesting too. It still holds true that the results might be caused by the subjectivity of the parents' assessment, as the parents judge the communication skills of their children incorrectly. We should also consider the aspect of the family social background – the parents who classified their children into the zone of structural deficiencies or conditions indicating the SLI profile while being excluded from the risk groups in the criterion-referenced tests might have a good socioeconomic status and high level of education and therefore have high expectations of their child. Another option is either the lack of communication opportunities offered by such parents to their children because of their workload or the absence of sufficient speech models, preventing the child from adopting correct communication and language habits.

Further prospects

We compared two groups of children (TD and SLI) in the study. The third group, composed of children threatened by hereditary predisposition in the form of the incidence of certain specific learning disorders within their closest relatives (the child's parents and siblings), has been omitted. We are nevertheless planning the inclusion of the group into the next assessment of the CCC-2, as well as more detailed evaluation of the statistical indices of the test.

The validation of the questionnaire could be carried out by means of correlations between the tests used within the ELDEL project for the classification of children into the individual groups and between their criteria. The correlation coefficients could be significant for the evaluation of the extent of the concordance between the parents' assessment in the individual CCC-2 sub-tests concentrating on the specific skills of the child and the language tests/examinations used in the individual stages. This would give us the opportunity to evaluate the communication skills of children at the separate language levels that the tests and examinations focus on.

The study was supported by the project 215961FP7-PEOPLE-2007-1-1-ITN, Marie Curie Actions – Networks for Initial Training, ELDEL – WP2 coordination by Margaret Snowling, Senior Researchers Marina Mikulajová (SR), Anna Kucharská (ČR), Experienced Reseacher in ČR Zuzana Jagerčíková.

References

Bishop, D. V. M., McDonald, D. (2009). Identifying language impairment in children: combining language test scores with parental report. *International Journal of Language & Communication Disorders*, 44, 5, 600–615.

Bishop, D. V. M. (1989). Development of the Children's Communication Checklist (CCC): A Method for Assessing Qualitative Aspects of Communicative Impairment in Children. *Journal of Child Psychology and Psychiatry*, 39, 6, 879–891.

Ferguson, M. A., Hall, R. L., Riley, A., Moore, D. R. (2011). Communication, Listening, Cognitive and Speech Perception Skills in Children with Auditory Processing Disorder (APD) or Specific Language Impairment (SLI). *Journal of Speech, Language, and Hearing Research*, February, 54, 211–227.

Franke, H., Mikulajová, M., Buntová, D. (2011). Dotazník komunikačných schopností dieťaťa CCC-2 – slovenská overovacia štúdia. [Child Communication Questionnaire CCC-2 – Slovak Verification Study]. *Logopaedica XIV.* Bratislava: Mabag, 96–105.

Helland, W. A., Biringer, E., Helland, T., Heimann, M. (2009). The usability of a Norwegian adaptation of the Children's Communication Checklist Second Edition (CCC-2) in differentiating between language impaired and non-language impaired 6-to 12-year-olds. *Scandinavian Journal of Psychology*, 50, 287–292.

Klenková, J. (2006). *Logopedie [Speech therapy].* Praha: Grada.

Lechta, V. et al. (2003). *Diagnostika narušené komunikační schopnosti [Diagnosis of impaired communication ability].* Praha: Portál.

Moll, K., Thompson, P. A., Mikulajova, K., Jagercikova, Z., Kucharska, A. Franke, H., Hulme, Ch., & Snowling, M. J. (2016). Precursors of Reading Difficulties in Czech and Slovak Children At-Risk of Dyslexia. *Dyslexia*, 22, 2, 120–136, doi: https://doi.org/10.1002/dys.1526

Norbury, C. F., Nash, M., Baird, G., Bishop, D. V. (2004). Using a parental checklist to identify diagnostic groups in children with communication impairment: a validation of the Children's Communication Checklist-2. International *Journal of Language & Communication Disorders*, 39, 3, 345–364.

Podpěrová, H. Rodičovská zkušenost s dětmi s narušeným vývojem řeči. [Parental experience with children with language impairment]. Bakalářská práce. Bachelor thesis (Praha: PedF, 2013.

Sotáková, H. (2012). ELDEL projekt [The ELDEL project]. *Pedagogika*, 1–2, 211–216.

Vitásková, K., Peutelschmiedová, A. (2005). Logopedie [Speech therapy]. Olomouc: UP.

doc. PaedDr. et PhDr. Anna Kucharská, Ph.D.
Mgr. Helena Podpěrová
Department of psychology, Faculty of Education, Charles University
anna.kucharska@pedf.cuni.cz
helena.podperova@seznam.cz